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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,161	02/24/2004	Katsumi Ishikawa	056208.53279US	2360
23911	7590	02/08/2006		
CROWELL & MORING LLP INTELLECTUAL PROPERTY GROUP P.O. BOX 14300 WASHINGTON, DC 20044-4300			EXAMINER BAUER, SCOTT ALLEN	
			ART UNIT 2836	PAPER NUMBER

DATE MAILED: 02/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

BY

Office Action Summary	Application No.		Applicant(s)	
	10/784,161		ISHIKAWA ET AL.	
	Examiner		Art Unit	
	Scott Bauer		2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 is/are rejected.
- 7) ☒ Claim(s) 2-4 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/24/2004</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Specification

1. The specification appears to be a direct translation from the parent application. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toshio (US 6,580,627) in view of Igarashi (US 6,057,728).
4. With regard to Claim 1, Toshio teaches a drive circuit (100) for controlling a switching device ON/OFF, comprising a short circuit detection means (194) that detects short circuit of the switching device, a soft cutoff means (262 & 266) that gradually decreases the gate terminal voltage of the switching device when short circuit is detected by the short circuit detection means (column 6 lines 63-67 & column 7 lines 1-

14), and an ON-pulse retention means (250 & 252) that retains the drive circuit (146) output ON when the collector terminal voltage detected by the voltage detection means (170 & 172) exceeds a specified value.

Toshio does not teach that a gate voltage detection means that detects the gate terminal voltage of the switching device is used to drive the ON-pulse retention means to retain the drive circuit output on when the gate terminal voltage detected by the gate voltage detection means exceeds a specified value.

Igarashi, in Figure 2, teaches a semiconductor circuit and power transistor protection circuit wherein the current of the IGBT (1) and the gate voltage of the IGBT are monitored to detect an over-current condition. A first comparator (3) senses the IGBT current, and if the current is above a reference voltage, the comparator indicates a fault. The second comparator (5) senses the gate voltage of the IGBT and outputs a signal that is indicative of a fault. If an arc is indicated at the by the gate voltage and the IGBT current, then the circuit is shut down.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Toshio with Igarashi, by using the gate voltage sensing comparator taught by Igarashi to control the driver taught by Toshio, for the purpose of preventing noise at the current sensing means (172) from triggering a false over-current condition (Igarashi Column 2 lines 18-27). The circuit of Toshio in view of Igarashi comprises the circuit taught by Toshio with the gate voltage connection circuit taught by Igarashi. The gate voltage detector circuit has its input connected to node 162 of the circuit taught by Toshio. The output is then fed to another one-shot

multivibrator (252) as taught by Toshio and then out put to a NOR gate as taught by Igarashi. The NOR gate is also connected to the voltage input from Flip-Flop 158 and is fed to the driver (146) of Toshio.

Allowable Subject Matter

5. Claims 2-4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. Claim 2 would be allowable if rewritten in independent form including all of the limitations of the base claim because the prior art of record does not teach or fairly suggest a drive circuit for a switching device according to claim 1 wherein a gate voltage clamp means that clamps the gate voltage of the switching device, wherein the gate voltage clamp means is operated by an output signal of the ON-pulse retention means.

Toshio in Figure 5 teaches the use of a gate voltage clamp means that clamps the gate voltage of the switching device. However, Toshio does not teach that the clamping means is operated by an output signal of the ON-pulse retention means.

7. Claim 3 would be allowable if rewritten in independent form including all of the limitations of the base claim because the prior art of record does not teach or fairly

suggest a drive circuit for a switching device according to claim 1, wherein the switching device is one with voltage driven sense function, which is provided with a gate terminal, terminal No. 1, terminal No. 2, and terminal No. 3, where the main current is applied between the terminal No. 1 and terminal No. 2 and the sense current in proportion to the main current is applied between the terminal No. 1 and terminal No. 3 by applying voltage to the gate terminal, and the ON-pulse retention means retains the drive circuit output ON when the gate terminal voltage detected by the gate voltage detection means exceeds a specified value and also the sense voltage of a sense resistor, connected in series to the terminal No. 3 of the switching device, exceeds a specified value.

Toshio teaches an IGBT switching device wherein the switching device is one with voltage driven sense function, which is provided with a gate terminal, terminal No. 1, terminal No. 2, and terminal No. 3, where the main current is applied between the terminal No. 1 and terminal No. 2 and the sense current in proportion to the main current is applied between the terminal No. 1 and terminal No. 3 by applying voltage to the gate terminal. However Toshio does not teach that the one-shot multivibrator (252) keeps the driver (146) on when the gate voltage exceeds a specified value.

8. Claim 4 would be allowable if rewritten in independent form including all of the limitations of the base claim because the prior art of record does not teach or fairly suggest a drive circuit for a switching device according to claim 1, further comprising a pulse width extension means that extends the pulse width of a pulse signal inputted to the drive circuit.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott Bauer whose telephone number is 571-272-5986. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on 571-272-2058. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAB
23 JAN 2006



PHUONG T. VU
PATENT EXAMINER